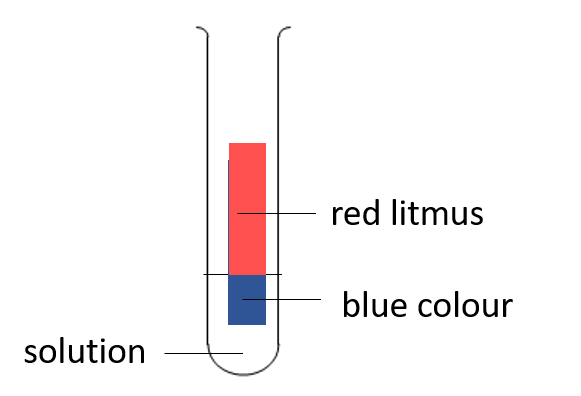
**Identifying alkalis**

An unknown solution was poured into a test tube.

The red litmus paper turned blue.

* 1. What type of solution is in the test tube?

Put a tick (✓) in the box next to the best answer.

|  |  |  |
| --- | --- | --- |
| **A** | acid |  |
|  |  |  |
| **B** | alkali |  |
|  |  |  |

* 1. Which of the following solutions could be inside the test tube?

For each statement, tick (✓) **one** column to show what you think*.*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | I am **sure** this is right | I think this is right | I think this is wrong | I am **sure** this is wrong |
| **A** | vinegar |  |  |  |  |
| **B** | bicarbonate of soda |  |  |  |  |
| **C** | ammonia |  |  |  |  |
| **D** | sodium chloride solution |  |  |  |  |
| **E** | sodium hydroxide solution |  |  |  |  |

*Chemistry > Big idea CSU: Substances and properties > Topic CSU3: Acids and alkalis > Key concept CSU3.1: pH scale*

|  |
| --- |
| **Diagnostic question** |
| **Identifying alkalis** |

**Overview**

|  |  |
| --- | --- |
| Learning focus: | Acidic and alkaline solutions may be compared using the pH scale. |
| Observable learning outcome: | Identify and give examples of alkalis. |
| Question type: | confidence grid |
| Key words: | alkali |

**What does the research say?**

Research (Cros et al., 1986) found that first year university students in the study were not as knowledgeable about bases as they were acids. The students found it easy to give examples of acids with the most frequently mentioned being hydrochloric, sulfuric and ethanoic. However, when asked to name bases, 43% could not name more than two.

Toplis (1998) wrote up some in-school action research looking at student understanding before and after teaching a topic on acids and alkalis. Before teaching, students gave examples of acids relating to food. After teaching they showed increased knowledge of laboratory acids. However, their knowledge of alkalis did not appear to increase. Even though the students had tested solutions with litmus and did seem to show good understanding of the colour change and whether it showed an acid or an alkali, they did not seem to have made the connection with the names of the substances on the bottles. In reflection, Toplis concluded that he needed to look again at the role of practical work in the topic and postulated that the students may have been overloaded with too many new ideas and words that were beyond their everyday experience. A clearer focus on the purpose of the practical work may have been of benefit.

**Ways to use this question**

The initial multiple- choice question provides a quick check that students can correctly connect the colour of litmus with whether a solution is an acid or an alkali.

Students should complete the confidence grid individually. This could be a pencil and paper exercise, or you could use an electronic ‘voting system’ or mini white boards and the PowerPoint presentation.

If there is a range of answers, you may choose to respond through structured class discussion. Ask one student to explain why they gave the answer they did; ask another student to explain why they agree with them; ask another to explain why they disagree, and so on. This sort of discussion gives students the opportunity to explore their thinking and for you to really understand their learning needs.

*Differentiation*

You may choose to read the questions to the class, so that everyone can focus on the science. In some situations, it may be more appropriate for a teaching assistant to read for one or two students.

**Expected answers**

1a B

b B, C and E are all alkalis

**How to respond - what next?**

A student who is only confident that B (bicarbonate of soda solution) is alkaline may only be familiar with everyday acids and alkalis. A student who is confident that E (sodium hydroxide solution) is alkaline but not sure about ammonia may benefit from a more explicit introduction to laboratory alkalis.

The following BEST ‘response activities’ could be used in follow-up to this diagnostic question:

* Drain cleaner

**Acknowledgments**

Developed by Helen Harden (UYSEG).

Images: None

**References**

Cros, D., et al. (1986). Conceptions of first-year university students of the constituents of matter and the motions of acids and bases. *European Journal of Science Education,* 8(3)**,** 305-313.

Toplis, R. (1998). Ideas about acids and alkalis. *School Science Review,* 80(291)**,** 67-70.